when a very powerful Nernst lamp was employed. Moreover, this sustained gaze is always accompanied by great fatigue, for reasons already adduced, and especially so in observing a very feebly luminous surface of small area in a dark room. The sustained gaze at small bright objects, as is well known, is, in fact, the most effectual way of inducing hypnotic sleep.

But although one cannot imitate all M. Blondlot's experiments by purely subjective perceptual processes without employing some source of illumination, I have thought it advisable to direct attention to these more recent physiological discoveries, the more so as M. Blondlot pays no attention to them in any of his publications, and does not state with what visual apparatus one ought to observe, nor does he give warning of the illusions one may fall into in carrying out his experiments. But the foregoing statements will at least serve to remind all those who take the trouble to repeat M. Blondlot's experiments that in vision in the dark changes in brightness, form and colour may arise from a purely subjective source. These purely subjective changes, however, do not depend upon any optical illusion, but, like the " shadow-like " appearances of the " grey glow " and the " red glow," are brought into existence by the competition between the two elementary structures of the visual organ, and correspond to objective processes in the retina.

As soon as the phenomena observed by M. Blondlot shall have been incontestably proved by means of objective instruments of precision, these few remarks on the *n*-rays will be only of secondary importance.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—At a meeting held at The Museums, Cambridge, on February 8, Prof. Newton, F.R.S., being in the chair, it was decided to take steps to perpetuate the memory of the late Mr. J. S. Budgett. Since his return from his last expedition to Africa, Mr. Budgett had made some important observations on the material collected by him, but a large part of the valuable material which he gave his life to obtain was necessarily untouched by him. It is proposed that this should be worked out by some of his friends, and the results published, with the observations and drawings which he had himself made. The work would be edited by Prof. J. Graham Kerr, and suitably illustrated. It is also proposed, if the funds available are sufficient, to add to the volume a reprint of all Mr. Budgett's former writings, so that the volume will become a memorial of his life's work. Subscriptions towards the cost of preparing this volume should be sent to Mr. A. E. Shipley, Christ's College, Cambridge.

A VERBATIM report of the conference of teachers, held under the auspices of the London Technical Education Board on January 7–9, appears in the *London Technical Education Gazette*—the official circular of the Board—for January and February.

AT a joint meeting of the academical and university councils of Paris, some interesting remarks were made by M. Liard arising out of the recent changes according to which professors of secondary education were last year, for the first time, allowed to sit on juries for the baccalaureate. An opportunity has been given to these professors of expressing an opinion on the work submitted to them, and they all agree in considering that the subjects studied seem to appeal to the memory rather than to the faculties of observation, reflection and judgment.

THE Childhood Society, the object of which is the scientific study of the mental and physical conditions of children, has arranged a course of four public lectures to be given at the Sanitary Institute, commencing on Thursday, February 25. The lectures will be as follows:—" Some Elementary Aims in Education," by Mr. Hamilton Hall; " Protection of Feeble-minded Children during and after School Age," by Prof. W. A. Potts; " Physiology in the Curricula of Primary and Secondary Schools," by Dr. D. Sommerville; and " Child Punishments," by Dr. H. R. Jones.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, November 26, 1903.—" On the Distribution of Stress and Strain in the Cross-section of a Beam." By John **Morrow,** M.Sc. (Vict.), Lecturer in Engineering, University College, Bristol.

The author describes some experiments on the measurement of lateral or transverse strains in specimens of wrought and cast iron when subjected to bending. The instrument used for the determination of the displacements of the sides of a beam consists essentially of two cranked levers pivoted together. At one extremity these are in contact with the points on the specimen between which the change of length is required, while the relative motion of the other ends is measured optically by means of a fixed and a tilting mirror. This method of measurement allows of great precision and delicacy of reading. In this case the lateral displacements were observed to the nearest 1/400000 of a centimetre.

The beams used were about 3 cm. broad and 6.5 cm. deep, and they were supported on knife-edges about 90 cm. apart. Measurements of the transverse extensions or contractions were made at seven different points in the depth of the beam, while the applied bending couple was increased by definite increments of about 9347 kg.cm. each.

The actual strains proved to be appreciably smaller than those which might be expected from the Bernoulli-Eulerian theory.

The relations obtaining between the lateral and linear strains, for the materials in question, were found from independent experiments in direct tension and compression, and by a comparison of these with the transverse strains in the beams, the amount and distribution of the stresses over the cross-sections of the beams were inferred.

The results for cast iron specimens showed that, at the lower loads, the longitudinal stress varies as the distance from the neutral axis, but that in amount it is less than would be expected from theoretical considerations. As the load is increased, however, the strain diagrams become more and more curved in the direction of a decreasing strain at greater distances from the neutral axis, and this is accompanied by a displacement of the neutral surface towards the compression side of the beam.

It is well known that the existing theory does not give a completely satisfactory account of the actions in a beam. This paper is therefore important, not only for its own results, but because it opens up a new method of experimentally approaching this and the allied subjects, and so facilitates further research on similar lines.

February 4.—" Conjugation of Resting Nuclei in an Epithelioma of the Mouse." By E. F. **Bashford,** M.D., and J. A. **Murray,** M.B., B.Sc. Communicated by Prof. J. Rose Bradford, F.R.S.

In a previous communication the authors directed attention to the fact that the power of cell proliferation, which has been proved to occur in an epithelioma of the mouse (Jensen), is a phenomenon unparalleled in the mammalia. A mass of tumour, 16 lb. in weight, has been produced by artificially transplanting portions of the original growth and its descendants.

In seeking to throw light on this fact, the authors have studied carefully the phenomena which follow the transplantations of portions of the tissue to new sites, and have found that the tumours which arise are the genealogical descendants of the cells introduced. They have studied the growth of the tumours which arise at successive stages of twenty-four hours. In a tumour removed on the eighth day, and less than half a split pea in size, conjugation of resting nuclei has been observed. To take a specific case, the nuclei of two adjacent cells are continuous through the cell wall by a tube-like bridge, in the middle of which a strand of nucleolar substance with fusiform swellings in either cell is visible. The cells of this particular case are adjacent to the stroma, and close to the outer surface of the young tumour.

February 11.—"On the Compressibilities of Oxygen, Hydrogen, Nitrogen, and Carbonic Oxide between One Atmosphere and Half an Atmosphere of Pressure, and on the Atomic Weights of the Elements Concerned.—Preliminary Notice." By Lord **Rayleigh,** O.M., F.R.S.

The observations now referred to were conducted with an apparatus designed upon the same lines as that already described.[1] It must suffice to mention that the only important modification lay in the fact that the two single volumes, which, when employed together, constitute the double volume, were used separately and alternately, so as to eliminate in each set of measurements any question as to what the ratio of these volumes exactly is. It is hoped to give a full description of the method when it has been extended to the examination of other gases, such as nitrous oxide and carbonic anhydride. The temperatures ranged from $10°–15°$, and care was taken that in each measurement the mean temperatures should be almost exactly the same for the single and for the double volume.

The results were reduced much as previously explained, and give for the values of B, which, according to Boyle's law, should be unity,

Oxygen ...	1·00040
Hydrogen	0·99976
Nitrogen ...	1·00017
Carbonic oxide ...	1·00028

B here denotes the quotient of the value of pv at the half atmosphere by the corresponding value at the whole atmosphere. That it would be less than unity in the case of hydrogen, and exceed unity for the other gases, is what would be anticipated from their behaviour at higher pressures.

If we measure p in atmospheres, and assume, as has usually been done, *e.g.* by Regnault and Van der Waals, that at small pressures the equation of an isothermal is

$$pv = PV(1 + ap),$$

where PV is the value of the product in a state of infinite rarefaction, then

$$a = 2(1 - B).$$

Probably the chief interest of a knowledge of the coefficient a is the application to deduce a correction to the relative densities of gases as observed at atmospheric pressure, so as to determine what would be the relative densities in a state of great rarefaction, to which alone Avogadro's law is applicable.[2]

Taking oxygen as a standard, we see that the small correcting factor to be introduced in order to pass from the ratio of densities at one atmosphere to that at great rarefaction is $(1+a)/(1+a_0)$, or $1+2 (B_0 - B)$, the suffix o relating to oxygen, that is, as follows :—

Hydrogen	1·00128
Nitrogen ...	1·00046
Carbonic oxide ...	1·00024

The double of the first number, viz. 2·0026, represents, according to Avogadro's law, the volume of hydrogen which combines with one volume of oxygen at atmospheric pressure to form water. Direct determinations by Scott gave 2·00245, and Morley, in his later work, found 2·0027, so that there is here a good agreement.

The following table gives the densities of the various gases, referred to oxygen = 16, at atmospheric pressure and at very small pressure, as deduced from my own observations.[3]

Gas	Atmospheric pressure.	Very small pressure.
Hydrogen	1·0075	1·0088
Nitrogen	14·003	14·009
Carbonic oxide ...	14·000	14·003

From the researches of M. Leduc and Prof. Morley, it is probable that the above numbers for hydrogen are a little, perhaps one thousandth part, too high.

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[1] "On the Law of the Pressure of Gases between 75 and 150 Millimetres of Mercury" (*Phil. Trans.*, A, vol. cxcviii., pp. 417–30, 1902).
[2] The application to oxygen and hydrogen was made in my paper, "On the Relative Densities of Oxygen and Hydrogen" (Roy. Soc. *Proc.*, vol. l., p. 448, 1892; 'Scientific Papers,' vol iii., p. 525.
[3] Roy. Soc. *Proc.*, vol. liii., p. 134, 1893; vol. lxii., p. 204, 1897; "Scientific Papers," vol. iv., pp. 39, 352.

The uncorrected number (14 003) for nitrogen has already been given,[1] and contrasted with the 14·05 obtained by Stas. This question deserves the attention of chemists. If Avogadro's law be strictly true, it seems impossible that the atomic weight of nitrogen can be 14·05.

From the molecular weight of CO, viz. 28,006, we deduce, as the atomic weight of carbon, 12·006.

It should be mentioned that D. Berthelot[2] has, meanwhile, calculated very similar numbers, based upon the observations of Leduc.

Challenger Society, January 27.—Dr. E. J. Allen in the chair.—On behalf of the Marine Biological Association, Dr. **Allen** exhibited a chart showing the positions of freeing and recapture of marked plaice in the North Sea, and their probable lines of migration.—Dr. **Fowler** contributed notes on the vertical distribution of two Biscayan Chætognatha—*Sagitta serratodentata,* apparently seeking the surface by day, but deserting it for deeper water, down to 100 fathoms, by night or after rain ; *Krohnia hamata,* represented merely by small and immature specimens between 50 and 500 fathoms, larger specimens occurring only between 500 and 2000 fathoms ; none were captured between the surface and 50 fathoms. This observation tends to strengthen the theory of the continuity of the Subarctic and Subantarctic plankton by way of the mesoplankton.

Zoological Society, February 2.—H.G. the Duke of Bedford, K.G., president, in the chair.—Mr. R. **Lydekker** read a paper, illustrated by coloured lantern-slides, on the subspecies of the giraffe (*Giraffa camelopardalis*). The author enumerated ten subspecies, and pointed out the distinguishing characters of each.—A paper was read by Messrs. Oldfield **Thomas,** F.R.S., and Harold **Schwann** which contained an account of a collection of mammals from Namaqualand presented to the British Museum by Mr. C. D. Rudd. The collection consisted of 160 specimens, referable to 28 species or subspecies, of which one new species and three new subspecies were described in the paper.—Mr. F. E. **Beddard,** F.R.S., read a paper on the arteries of the base of the brain in certain mammals, based on observations he had made on individuals that had died in the society's menagerie.—Mr. G. A. **Boulenger,** F.R.S., read a paper which contained the descriptions of three new species of fishes discovered by the late Mr. J. S. Budgett in the Niger.—Mr. **Boulenger** also described the type specimen of the silurid fish, *Clarias laeviceps,* Gill, which had been entrusted to him by the Smithsonian Institution.

Faraday Society, February 2.—Dr. J. W. Swan, F.R.S., president, in the chair.—Notes on the welding of aluminium : S. O. **Cowper-Coles.** After referring to various machines and processes for welding aluminium, the author went on to describe his own process, which requires no flux or solder, and does not necessitate the hammering of the joint when in the pasty state, the process being especially suitable for wire, rods, and tubes.—Some applications of the theory of electrolysis to the separation of metals from one another : M. **Hollard.** The only principle hitherto involved in electrolytic separations has been based on the method of successive potentials, each metal depositing at the potential proper to that metal. In practice this principle has only been applied to metals (copper and silver, silver and bismuth, mercury and bismuth) the polarisation potentials of which are lower than that of hydrogen. Metals having polarisation potentials higher than that of hydrogen cannot be separated by gradual increase of the E.M.F., on account of the extremely small fraction of the current then used to precipitate the metal, hydrogen ions carrying most of the current. The author has therefore made use of three other applications of the theory of electrolysis, depending on (1) reduction of the resistance of the bath by suppressing the formation of gas at the anode ; (2) influence of the nature of the kathode ; (3) formation of complex salts. —Mr. G. Watson **Gray** read a short preliminary note describing an explosion of some high grade ferro-silicon that occurred spontaneously a short time ago at Liverpool. The gases evolved on boiling a specimen in distilled water were

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[1] Rayleigh and Ramsay, *Phil. Trans.*, A, vol. clxxxvi., p. 187, 1895.
[2] *Comptes rendus,* 1898.

found to contain PH_3 and AsH_3. The former was in the greater proportion, and to that probably the explosions were due.

Mineralogical Society, February 2.—Dr. Hugo Müller, president, in the chair.—Mr. Harold **Hilton** contributed a paper on the gnomonic net. This net consists of lines giving equal longitudes and latitudes for every ten degrees on a plane touching a point on the equator, the former being hyperbolæ and the latter straight lines. The author pointed out how the net could be used for the graphical determination of angles between poles on the sphere.—Mr. G. T. **Prior** described a new sulphostannite of lead from Bolivia, to which he gave the name Teallite, in honour of the Director of the Geological Survey. The mineral in its graphite-like appearance resembles franckeite and cylindrite, but differs from them in not containing antimony. It has the simple formula $PbSnS_2$, and is orthorhombic with angles $c(001) \wedge o(111) = 62°$, $c(001) \wedge p(221) = 75°$, and $m(110) \wedge m'''(1\bar{1}0) = 86°$. It has a perfect cleavage parallel to $c(001)$ and a specific gravity of 6·36. In connection with the investigation of this mineral new analyses were made of franckeite and cylindrite.—Mr. W. F. **Ferrier** gave an account of his discovery of the deposits of corundum in Canada, and Prof. H. A. **Miers** described a visit to the Rashleigh collection of minerals now deposited in the Museum of the Royal Institution of Cornwall at Truro.

Chemical Society, February 4.—Dr. W. A. Tilden, F.R.S., president, in the chair.—It was announced that the council proposed to send a congratulatory address to Prof. Mendeléeff on the occasion of his seventieth birthday, Tuesday, February 9, which was also the date of his official retirement.—The following papers were read :—The constitution of epinephrine : H. A. D. **Jowett.** The hæmostatic constituent of suprarenal gland secretion was first isolated by Abel and Crawfurd, and was subsequently obtained by Takamine, who named it adrenalin, and by von Furth, who called it suprarenine. The author finds that this substance has the composition $C_9H_{13}O_3N$, and that when fully methylated and oxidised it furnishes trimethylamine and veratric acid, whence he suggests that it should be represented by the formula

$$C_6H_3(OH)_2.CH(CH_2OH).NHMe(1:2:4)$$

or

$$C_6H_3(OH)_2.CH(OH).CH_2.NHMe(1:2:4),$$
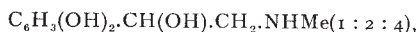
the latter being the more probable.—Studies on the electrolytic oxidation of phenols, part i. : A. G. and F. M. **Perkin.** By the oxidation of pyrogallol, purpurogallin was obtained, whilst gallic acid furnished purpurogallincarboxylic acid.—Action of nitrogen peroxide on 1-nitrocamphene : M. O. **Forster** and F. M. G. **Micklethwait.** In this reaction a number of complex compounds were obtained the constitutions of which have not yet been determined.—The tautomeric character of the acyl thiocyanates : R. E. **Doran.** A study of the conditions under which acetyl thiocyanate reacts as such or as the tautomeric thiocarbimide.—Resolution of α-β-dihydroxybutyric acid into its optically active constituents : R. S. **Morrell** and E. K. **Hanson.** The physical characters of the two optically active acids which were obtained by fractional crystallisation of the quinidine salt of the racemic acid are described.—Aromatic compounds obtained from the hydroaromatic series, part i., the action of bromine on 3 : 5-dichloro-1 : 1-dimethyl-$\Delta^{2:4}$-dihydrobenzene : A. W. **Crossley.** A description of the derivatives obtained.—The action of nitrogen sulphide on organic substances : F. E. **Francis** and O. C. M. **Davis.** An enumeration of the cyanidins obtained by the action of nitrogen sulphide on aromatic aldehydes.—Dibenzoylchloroimide : F. D. **Chattaway.** The author claims priority, over Stieglitz and Earle, in the description of this compound and some of its derivatives.

Mathematical Society, February 11.—Prof. H. Lamb, president, and temporarily Prof. E. B. Elliott, vice-president, in the chair.—The following papers were communicated :—On the roots of the equation $\dfrac{1}{\Gamma(x+1)} = \text{const.}$: G. H. **Hardy.** When the constant on the right hand side

is zero, the rate of increase of the nth root approximates to that of n when n is large, and this result constitutes an exception to a general law which regulates the relation of the rate of increase of the roots to that of the function. It is shown that when the constant is not zero the rate of increase of the nth root is that of $n/\log n$, and the exception is removed. The significance of the result in relation to the theory of integral functions is discussed.—Some extensions of Abel's theorem on power series on the circle of convergence : G. H. **Hardy.** The extension is to double series. When a double power series converges on the locus that corresponds to the circle of convergence of a simple series, either (a) when summed first by rows, or (b) when summed first by columns, or (c) when the two suffixes are simultaneously increased, its sum is equal to the limit of the function at the corresponding point of the locus, provided the limiting operations are performed in ways that correspond to the three specified methods of summation.—On group-velocity : Prof. H. **Lamb.** The paper contains a new proof of the relation between wave-velocity and group-velocity, and the possibility of a negative group-velocity is discussed. If the group-velocity were negative, the waves and the groups would travel in opposite directions. Such a possibility has been suggested in connection with very intense absorption. Examples are given of mechanical systems free from dissipation which possess the required property. In such systems the disturbance that travels away from any source, when analysed into harmonic waves, is found to consist of waves travelling towards the source, but the groups by which the energy is propagated travel away from the source. The reflection and refraction of waves at the boundary of a medium in which the relation between wave-velocity and wave-length is compatible with a negative group-velocity are discussed, and the ratio of amplitudes of incident and reflected waves is found.—On a certain double integral : Prof. A. C. **Dixon.**—On an appropriate form of conductor for a moving point singularity : Prof. A. W. **Conway.**—On the irreducibility of perpetuant types : P. W. **Wood.**—On the representation of $\int_0^\infty cn \ xt \ e^{-t} \ dt$ and other like integrals by means of continued fractions : Prof. L. J. **Rogers.** The paper deals with a generalisation of the so-called " addition theorem " for Bessel functions of zero order. A series of functions $f_1, f_2, \ldots$ can be determined from a given function f so that $f(x+y) = Af(x)f(y) + Bf_1(x)f_1(y) + Cf_2(x)f_2(y) + \ldots$. The determinants that arise in the process of obtaining these functions are closely related to the process of converting a series into a continued fraction. It is generally difficult to complete the latter process, but the relation between the two processes leads to a simplification.

CAMBRIDGE.

Philosophical Society, January 18.—Dr. Baker, president, in the chair.—On differences between the spectra at anode and kathode in certain gases, and on probable reasons for those differences : Prof. **Liveing,** F.R.S. The author found that in hydrogen at 7 mm. pressure the light at the anode gives only the second spectrum of hydrogen, at lower pressure the kathode glow shows only the first spectrum, and by further reduction of pressure the second spectrum is driven quite up to the anode and is then seen only in a bright spot upon the anode. The behaviour of the two banded spectra of nitrogen is exactly similar. In pure oxygen the anode is dark, but the kathode glow emits all the three spectra described by Schuster. The anode spectrum of the halogens is a continuous one, while the kathode glow gives a spectrum of lines, and the gas along the whole line of the discharge emits rays which, like kathode rays, make the tube fluoresce. The vapours of such metals as could be readily observed in glass tubes give each but one spectrum, the same in all parts of the tube. The spectra of the two oxides of carbon are indistinguishable from each other, and are the same at both electrodes. Cyanogen gives in the kathode glow the well-known blue and violet shaded bands, and at the same time the bands at the red end shaded the reverse way, but no trace of either the carbonic oxide or of the candle-flame spectrum in any part of the tube. The appearance of the positive column in all cases agrees well with Prof. Thomson's theory

that the light arises from the association of ions, and has its origin in the positive ions, which in elements having diatomic molecules probably have not the same constitution as those molecules, but in elements with monatomic molecules may, when deionised, at once reproduce such molecules. The kathode glow the author ascribes to fluorescence, the gas acting as a screen to the kathode rays, and its molecules responding to the stimulus without being themselves permanently affected. This opinion rests on the way in which the glow maps out the course of the kathode rays, and on the observation that the spectral lines of the glow are in most cases reversible, and therefore probably have their origin in unaltered molecules of the several gases. In conclusion, the study of the kathode glow suggests that the solar chromosphere and corona are a huge kathode glow.—On a soluble colloidal form of ferric and of other phosphates : W. J. **Sell**, F.R.S.—On the distribution and spectra of metallic vapours in electric sparks : H. **Ramage.** —On the variation with wave-length of the double refraction in strained glass : L. N. G. **Filon.**—On the reflection of sound : Rev. H. J. **Sharpe.**

February 1.—Dr. Baker, president, in the chair.—Free-living fresh-water New Zealand nematodes : N. A. **Cobb.** Four new species, all belonging to known genera, are described. The specimens were dredged from the lakes, at depths ranging from 200 feet to 1150 feet.—Some High Andine and Antarctic Umbelliferæ : A. W. **Hill.** The communication dealt with the genera Crantzia (Nutt.) and Azorella (Lmk.), which are widely distributed in the southern hemisphere.—On the relative amount of ionisation produced in air and hydrogen by Röntgen rays : R. K. **McClung.** The object of the experiments described in this paper was to determine, if possible, the cause of the great discrepancy which exists between the results obtained by various experimenters who have previously worked on this subject. The results obtained by the various investigators differ very widely from one another. Experiments were made with various Röntgen ray bulbs in order to see whether the source of the rays had any influence upon the relative amounts of ionisation, and it was found that the source of the rays influenced the result to a very marked degree. Quite large variations in the ratio of the ionisation in hydrogen to that in air were obtained according to the bulb used. As different bulbs, of course, give out rays of different quality, it is evident from the experiments that the ionisation in hydrogen as compared with that in air depends upon the type of rays used. Further experiments are at present in progress to determine to what extent this variation depends upon the state of the vacuum in the Röntgen ray bulb. These experiments are as yet quite incomplete, but the indications are that the relative ionisation in the two gases does depend to some extent on the pressure of the gas in the bulb. Further experiments are to be made on this subject.

DUBLIN

Royal Dublin Society, January 19.—Mr. S. Geoghegan in the chair.—Prof. A. W. **Conway** read a paper on the reflection of electric waves from a moving plane conductor. —Prof. J. A. **McClelland** read two papers, (1) on the emanation given off by radium, (2) the comparison of capacities in electrical work (an application of radio-active substances). The first of these two papers contains an account of experiments made to test whether the emanation given off by radium is charged or not. The emanation is carried into a partially exhausted vessel by a current of air, the vessel being insulated and joined to a sensitive electrometer. No charge was detected. The ionisation produced in the vessel by the emanation is measured, and it is shown that if each emanation particle had a charge equal to or greater than the charge on the gaseous ion, a measurable deflection must have been observed, otherwise the ionisation produced by each emanation particle must have been greater than what is possible. The conclusion is therefore that the emanation is not charged. The substance of the second paper is as follows :—A *very steady* current can be obtained between two plates, one of which is kept at a high potential, by placing between the plates a quantity of uranium nitrate. This small steady current is used to charge the capacities to be compared to a given potential measured by an electrometer, and the time of charging is

accurately measured in each case. The two capacities are therefore compared by simply observing two intervals of time. Numbers are given to show the accuracy of the method and the wide range of capacities to which it is applicable. In particular it is shown that capacities as small as one micro-microforad can easily be detected and measured by this method.—Prof. G. A. J. Cole communicated a paper by Mr. J. R. **Kilroe** on soil separations by the centrifugal method.

PARIS.

Academy of Sciences, February 8.—M. Mascart in the chair.—The general law of distribution of rays in band spectra : H. **Deslandres.** Since the spectra obtained with a concave grating are too feeble for the purpose of verifying the author's hypotheses, he has used a plane grating with an astronomical mirror of silvered glass of 2·5 metres focal distance. This arrangement has given all the bands of the second group of nitrogen excellently defined. The law of distribution deduced is that, in general, each band, expressed in vibration numbers, is divisible into series of connected rays, each series being such that the successive intervals are in arithmetical progression.—A new electrical device for extinguishing the high frequency arc : M. **d'Arsonval.** In the production of high frequency currents for therapeutical use it is necessary to prevent the formation of an arc between the spark gap. By the use of a subsidiary condenser this result is obtained very simply.— Protective arrangements for electrical machines supplying high frequency generators : MM. **d'Arsonval** and **Gaiffe.** Numerous cases of breakdown of transformers and coils used in the production of high frequency currents are common, and one possible cause of this is the return of waves from the spark gap to the transformer. An arrangement of condensers and resistances is described by which this effect is stopped without any loss of power.—The action of phenyl-magnesium bromide upon anthraquinone. Symmetrical γ-dihydroxyl-γ-diphenyl-dihydro-anthracene : A. **Haller** and A. **Guyot.** Anthraquinone reacts in the normal manner with the phenyl magnesium compound, but the yield of the carbinol is poor, on account of the slight solubility of the ketone in ether.—On the mechanism of the transmission of the *n*-rays through wires of different substances : E. **Bichat.** The transmission of the *n*-rays by a wire is regarded as being analogous to the experiment in which light is transmitted from one end to the other of a curved glass tube, by successive reflections. In support of this view, experiments on wires of different materials show that the transmission only takes place if the material of the wire is transparent for these rays. Thus the effect is not produced by a wire of lead, but the rays are transmitted by wires of copper, aluminium and zinc, all of which have been shown to allow of the passage of the *n*-rays.—On the determination of the displacement of a battleship : J. A. **Normand.**—On the true value of the major axis of a cometary orbit when far removed from the sun, and the supposed hyberbolic character of the comet 1890 II. : Louis **Fabry.** The author interprets the calculations of M. Strömgren as leading to an elliptical orbit for the comet 1890 II.—Remarks on differential equations of which the general integral is an entire function : Émile **Borel.**—On certain θ-functions, and on some hyperelliptic surfaces to which they lead : M. **Traynard.**—On entire series with entire coefficients : M. **Fatou.**—On the zeros of a class of multiform transcendentals : Georges **Remoundos.**—On the flame spectra of the alkaline metals : C. **de Watteville.** Photographs of the spectra of lithium, sodium, and potassium show that the rays fall into two groups, those which are equally strong in all parts of the flame, and those which are more intense in the lower part of the flame, that is to say, in that portion which emits the Swan spectrum. It is found that the rays in the former class are those which belong to the principal series of the element considered, whilst those of the second group belong to the secondary series of rays. The differences of the spectra would appear to be due to thermal causes only.—On the function which represents the magnification of objects seen through a transparent cone : C. **Chabrié.**—On the magnetic effect of convection currents : C. **Gutton.** By means of the increase of luminosity of a phosphorescent screen it is possible to

demonstrate the magnetic effect of convection currents. This method is free from the experimental difficulties which arise from the use of astatic couples, but does not lend itself to quantitative measurements.—A new theory of influence machines : V. **Schaffers.**—On the relation which exists between sudden variations of the reluctance of a magnetised steel bar submitted to traction and the formation of Lüders's lines : L. **Fraichet.** During the time that new lines are being formed on the test piece, the variation of the reluctance is discontinuous, and when the variation of reluctance becomes continuous no new lines are observed.— Remarks on the subject of a note on osmosis by M. A. Guillemin : A. **Ponsot.**—On the use of the alternating current in electrolysis : André **Brochet** and Joseph **Petit.**— On the reduction phenomena produced by the action of alternating currents : F. **Pearce** and Ch. **Couchet.** Ferric alum is reduced nearly quantitatively by an alternating current when iron electrodes are used ; alkaline nitrates are reduced to nitrites with electrodes of cadmium and zinc. The reduction of other inorganic salts is mentioned, and also the production of aniline from nitrobenzene.—The production of the sulphides of phosphorus in the cold : R. **Boulouch.**—Observations relating to the action of heat and light on mixtures of phosphorus sesquisulphide and sulphur in solution in carbon bisulphide : E. **Dervin.**—The action of carbonic acid upon solutions of sodium nitrite : C. **Marie** and R. **Marquis.** In opposition to the statements of M. Louis Meunier, the authors maintain that nitrous acid is set free by the action of carbon dioxide upon a solution of sodium nitrite.—On the constitution and properties of vanadium steels : Léon **Guillet.**—On the diureides : homoallantoic ether : L. J. **Simon.**—On the phosphoric esters of glycol : P. **Carré.**—On the nature of starch : L. **Maquenne.**—The biochemical synthesis of olein and some esters : Henri **Pottevin.**—The formation of turpene compounds in the chlorophyll organs : Eug. **Charabot** and Alex. **Hébert.**—On the presence of an oxidising-reducing diastase in plants : J. E. **Abelous** and J. **Aloy.**—The geographical distribution of the marine Bryozoa and the theory of bipolarity : L. **Calvet.**—The influence of temperature on the duration of the phases of indirect division : J. **Jolly.**— On the assimilation of alcohols and aldehydes by *Sterigmatocystis nigra* : Henri **Coupin.** Certain alcohols, such as ethyl alcohol, glycerol, and mannite can be assimilated by the moulds, others (methyl alcohol, glycol) are indifferent, whilst a third class (amyl, propyl, butyl) are toxic.—On a special function of the mycorhizome of the lateral roots of vanilla : H. Jacob **de Cordemoy.**—On the stratification of the Montagne Noire : J. **Bergeron.**—Geological observations in the neighbourhood of Thonon-les-Bains : H. **Douxami.**—*Palaeoblattina Douvillei*—an insect or a trilobite : M. **Agnus.**

DIARY OF SOCIETIES.

THURSDAY, FEBRUARY 18.

ROYAL SOCIETY, at 4.30.—Further Researches on the Temperature Classification of Stars : Sir J. Norman Lockyer, K.C B, F.R.S.— Theory of Amphoteric Electrolytes : Prof. J. Walker, F.R.S.—Note on the Formation of Solids at Low Temperatures, particularly with regard to Solid Hydrogen : Prof. M. W. Travers.—Atmospherical Radio-activity in High Latitudes : G. C. Simpson.
ROYAL INSTITUTION, at 5.—Recent Research in Agriculture : A. D. Hall.
LINNEAN SOCIETY, at 8.—Mendel s Laws as Illustrated by Wheat Hybrids : R. H. Biffen. Heredity and Variation as seen in *Primula sinensis* : W. Bateson, F.R.S.—Formation of Secondary Wood in Psilotum : L. A. Boodle.

FRIDAY, FEBRUARY 19.

ROYAL INSTITUTION, at 9.—Condensation Nuclei : C. T. R. Wilson, F.R.S.
GEOLOGICAL SOCIETY, at 8.—Anniversary Meeting.
INSTITUTION OF MECHANICAL ENGINEERS, at 8.—Annual General Meeting ; followed by Discussion on Heat Treatment of Steel.—The Motion of Gases in Pipes, and the Use of Gauges to Determine the Delivery : R. Threlfall, F.R.S.
EPIDEMIOLOGICAL SOCIETY, at 8.30.—The Etiology of Scurvy : Dr. Myer Coplans.

SATURDAY, FEBRUARY 20.

ROYAL INSTITUTION, at 3.—The Life and Work of Stokes : Lord Rayleigh.

MONDAY, FEBRUARY 22.

SOCIETY OF ARTS, at 8.—Modern Book Printing : Charles T. Jacobi.
SOCIETY OF CHEMICAL INDUSTRY, at 8.—Duty Free Alcohol : Thomas T. Tyrer.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—A Pioneer Expedition to Angola : Capt. Boyd A. Cuninghame.—A Journey in Northern Uganda : Major P. H. G. Powell-Cotton.
VICTORIA INSTITUTE, at 4.30.—Observations on the Irrigation of India : Charles W. Odling.

TUESDAY, FEBRUARY 23.

ROYAL INSTITUTION, at 5.—Japanese Life and Character : Prof. E. Foxwell.
ANTHROPOLOGICAL INSTITUTE, at 8.15.—The Fijians in Peace and War : W. L. Allardyce, C.M.G.
INSTITUTION OF CIVIL ENGINEERS, at 8.—The Construction of Railway-Wagons in Steel : J. D. Twinberrow.—The Construction of Iron and Steel Railway Wagons : A. L. Shackleford.—Iron and Steel Railway-Wagons of High Capacity : J. T. Jepson.

WEDNESDAY, FEBRUARY 24.

SOCIETY OF ARTS, at 8 —Mahogany and other Fancy Woods available for Constructive and Decorative Purposes : Frank Tiffany.
SOCIETY FOR THE PROTECTION OF BIRDS, at 3.—Annual Meeting.
GEOLOGICAL SOCIETY, at 8.—Eocene and Late Formations surrounding the Dardanelles : Lieut.-Col. Thomas English, with Appendices by Dr. John Smith Flett, R. Holland, and R. B. Newton.—The Derby Earthquakes of March 24 and May 3, 1903 : Dr. C. Davison.

THURSDAY, FEBRUARY 25.

ROYAL SOCIETY, at 4.30.—*Probable Papers :* The Electromotive Phenomena in Mammalian Non-medullated Nerve : Dr. N. H. Alcock. —Further Observations on the *Rôle* of the Blood-Fluids in connection with Phagocytosis : Dr. A. E. Wright and Capt. S. R. Douglas.—A Contribution to the Pharmacology of Indian Cobra-venom : Major R. H. Elliot.
ROYAL INSTITUTION, at 5.—Electrical Methods of Measuring Temperature : Prof. H. L. Callendar, F.R.S.
INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Transatlantic Engineering Schools and Engineering : Dr. R. M. Walmsley. (Adjourned Discussion)

FRIDAY, FEBRUARY 26.

ROYAL INSTITUTION, at 9.—New Developments in Electric Railways : Alex. Siemens.
PHYSICAL SOCIETY, at 5.

SATURDAY, FEBRUARY 27.

ROYAL INSTITUTION, at 3.—The Life and Work of Stokes : Lord Rayleigh.
INSTITUTION OF CIVIL ENGINEERS, at 8.—Boiler-house Design : L. G. Crawford.

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